Epidemiology of recurrent major and minor depression with a seasonal pattern

The National Comorbidity Survey

DAN G. BLAZER, RONALD C. KESSLER and MARVIN S. SWARTZ

Background Previous estimates of the prevalence of seasonal affective disorder (SAD) in community samples have been in the range 2–10%, using methods not derived from DSM algorithms. We report the first community-based study to estimate major and minor depression with a seasonal pattern in a community-based sample using a diagnostic instrument derived from DSM – III – R.

Method A modified version of the Composite International Diagnostic Interview was administered to 8098 subjects in the 48 coterminous states of the USA (the National Comorbidity Survey) to assess the prevalence of major and minor depression with a seasonal pattern.

Results The lifetime prevalence of major depression with a seasonal pattern was 0.4%, and the prevalence of major or minor depression with a seasonal pattern was 1.0%. Among respondents with major depression, male gender and older age were associated with a higher prevalence with a seasonal pattern.

Conclusions Prevalence estimates of major and minor depression with a seasonal pattern are much lower than those found in previous studies of SAD in the community, probably due to the approach to diagnosis used in the present study, which more accurately represents DSM – III – R criteria for major depression with a seasonal pattern. The distribution of the disorder is similar to that found in previous studies except for the higher prevalence among males.

Rosenthal et al (1984) defined seasonal affective disorder (SAD) as a syndrome characterised by recurrent depressions that occur annually at the same time each year. Later, Rosenthal and co-workers developed the Seasonal Pattern Assessment Questionnaire (SPAQ) for the assessment of SAD (Rosenthal, 1987). Rosen et al (1990), using the SPAQ, found the prevalence of SAD to be 7.4%, and of sub-syndromal SAD 10.7% in a sample of 1234 persons interviewed by mailed questionnaire in New York, Maryland and Florida. Other community studies report prevalences of between 2.2 and 10% (Booker, 1992; Weicki, 1992; Partonen, 1993; Schlager, 1993; Ozaki, 1995).

DIAGNOSIS

No general studies of the prevalence of psychiatric disorders in the community have attempted to estimate the prevalence of DSM–III–R (American Psychiatric Association, 1987) and DSM–IV (American Psychiatric Association, 1994) major depressive disorder with a seasonal pattern. To be diagnosed with a mood disorder with a seasonal pattern according to DSM–III–R, the person must first meet criteria for a bipolar disorder (including bipolar disorder not otherwise specified) or recurrent major depression (including depressive disorder not otherwise specified) and then the seasonality of the disorder is determined. The criteria are made even more restrictive in DSM–IV, according to which a 'seasonal pattern' can only be applied to diagnoses of major depressive episodes, bipolar I disorder, bipolar II disorder or major depression, recurrent. Depressive disorder not otherwise specified is no longer permitted as a criterion.

SAMPLE

In the National Comorbidity Survey (NCS; Blazer, 1994) questions were asked to determine a seasonal pattern among individuals diagnosed with a lifetime history of major or minor depression in a national sample of 8098 subjects from the 48 coterminous states of the USA. The lifetime prevalence estimate of 17% for major depression presents an excellent opportunity to explore the prevalence of major depression with a seasonal pattern in a large number of subjects who meet criteria for a lifetime history of major depressive disorder, as well as to assess those factors which have been associated with a seasonal pattern, such as a higher than expected frequency among women, a higher frequency in persons at more northern latitudes and a higher frequency among younger persons (Kalton, 1983). In addition, the NCS permits us to compare seasonal patterns among persons with a diagnosis of major depression with persons with less severe depressive symptoms.

METHOD

The NCS is a nationwide study of the US population, aged 15–54 years, that was designed to estimate the prevalence, risk factors and consequences of psychiatric morbidity and comorbidity. It is based on a stratified, multi-stage area probability sample of the non-institutionalised civilian population in the 48 coterminous states, with a supplemental sample of students living in campus group housing. The survey was administered by the field staff of the Survey Research Center at the University of Michigan between 14 September 1990 and 6 February 1992. The 158 NCS interviewers were experienced interviewers who completed a rigorous programme of training to administer a modified version of the Composite International Diagnostic Interview (CIDI) reliably (Kessler, 1998).

The overall response rate for the survey was 82.4%. The distribution of demographic characteristics of the sample of 8098 respondents and of the general US population is similar (Blazer, 1994). The variables included in this analysis (other than psychiatric diagnosis) are primarily demographic variables. Two questions were asked to determine ethnicity. The first asked about Hispanic background and the second about the self-perception of race/ethnicity (White, Black or other). Respondents who reported a Hispanic

background in response to the first question were coded as such, regardless of their answer to the second question. Level of education was determined by asking the respondent the number of years of formal schooling she or he had completed. Income represents total family income before taxes during the year before the interview, including salaries, wages, social security, welfare and other income. For determining residence, persons were categorised as living in a large metropolitan area if they were part of the core of a standard metropolitan statistical area of 250 000 persons or more or on the fringe of such a metropolitan area. A small metropolitan residence included individuals who were in the core or on the fringe of areas of fewer of 250 000 persons. Rural residence included individuals who lived in non-metropolitan communities having fewer than 20 000 persons. After complete description of the study to the subjects, written informed consent was obtained.

The one variable with a substantial amount of missing data was income. Slightly over 6% of subjects did not provide data regarding income. A complex, regression-based scheme was developed to assign estimated values of income for cases in which data were missing (Kalton, 1983). This imputation used other social and demographic variables as predictors, specifically age, gender, ethnicity, region of country, education, occupation, hours worked per week, marital status, spouse education and spouse income, as well as an error term to maintain an unbiased variable estimate.

The DSM–III–R diagnosis of major depression with a seasonal pattern was derived from a modified version of the CIDI (Kessler, 1998). Minor depression was defined as identical to major depression with the exception that (a) between two and four symptoms (rather than five or more) are reported, and (b) the respondent has never experienced a major depressive episode, dysthymia, mania, hypomania or a mixed episode. The criteria for major depressive episode with a seasonal pattern are major depression (either pure or co-morbid) fulfilling the four criteria for a seasonal pattern according to DSM–III–R. Criteria for minor depressive episodes with a seasonal pattern include DSM–IV criteria for minor depression coupled with criteria for a seasonal pattern. (There is no actual DSM–IV diagnosis of minor depression with a seasonal pattern). The four criteria for seasonal pattern are: (a) a regular temporal relationship between the onset of an episode and a particular 60-day period of the year; (b) a regular temporal relationship between the remission of an episode and a particular day of the year; (c) at least three episodes in three years with a seasonal pattern, two of which were consecutive; and (d) seasonal episodes of mood disturbance outnumber any non-seasonal episodes of such a disturbance.

We further disaggregated this sample by testing two different interpretations of seasonal pattern; that is, a broad and a narrow pattern. Subjects were characterised as meeting broad seasonal pattern criteria if they had 50% or more of their episodes begin and

end at the same time of the year and had three or more such episodes. Subjects were characterised as meeting narrow seasonal pattern criteria if they had 66% or more of their episodes begin and end at the same time of the year and had three or more such episodes. This narrow definition does not meet DSM–III–R criteria which specify that seasonal episodes outnumber non-seasonal episodes by more than three to one, but does meet DSM–IV criteria.

Latitude of current residence was determined by dividing the coterminous United States into tertiles of latitude (north, middle south and south) and assigning each state to a tertile where the majority of the state land mass is located.

RESULTS

Of the 1382 subjects with a lifetime history of major depressive episodes, 248 (18% of the subjects diagnosed with major depression and 3% of the entire sample) reported that most of these episodes start the same time of the year (see Table 1). Of the 2330 subjects with a minor depressive episode, 382 (17% of those diagnosed with minor depression and 4.7% of the entire sample) reported that most start at the same time of the year. As the four criteria for a seasonal pattern are successfully applied, the numbers of subjects remaining eligible for the diagnosis decreases dramatically (Table 1). When these criteria are combined, only 34 subjects with major depression fulfil criteria for a seasonal pattern, and only 49 subjects

Table I Lifetime prevalence estimates of major and minor depression with a seasonal pattern by associated criteria conditions[1] (n=8098)

	Major depression (n=1382)			Entire sample (n=8098)			Minor depression (n=2330)			Entire sample (n=8908)		
	n	%	s.e.	n	%	s.e.	n	%	s.e.	n	%	s.e.
(a) Symptoms onset same time of the year	248	17.9	1.3	248	3.1	0.3	382	16.4	1.1	382	4.7	0.4
(b) Symptom remission same time of the year	145	10.5	1.1	145	1.8	0.2	231	9.9	0.8	231	2.9	0.3
(c) Three or more episodes start within same three-month period by history	105	7.6	0.9	105	1.3	0.2	149	6.4	0.6	149	1.8	0.2
(d) Three or more episodes end within same three months in a row	64	4.6	0.8	64	0.8	0.1	98	4.2	0.6	98	1.2	0.2
(e) 66% or more episodes follow seasonal pattern	22	1.6	0.5	22	0.3	0.1	34	1.5	0.4	34	0.4	0.1

1. If the subject did not meet criterion (a), then they were dropped from further analysis; similarly, if they did not meet criterion (b) etc. Subjects must meet criteria (a), (b), (c) and (d) to qualify for a seasonal pattern.

Table 2 Risk (odds) ratios for seasonal pattern of major and minor depression by selected demographic characteristics

	Major (n=34 of 1382)		Minor (n=15 of 948)	
	Odds ratio	95% CI	Odds ratio	95% CI
Gender				
Male	1.00	–	1.00	–
Female	0.46[1]	0.23–0.90	5.01[1]	1.13–22.9
Age				
15–24	0.17[1]	0.04–0.70[2]	0.18	0.03–1.04[3]
25–34	0.51	0.21–1.24	0.29	0.08–1.09
35–44	0.66	0.28–1.52	0.40	0.11–1.56
45–54	1.00	–	1.00	–
Ethnicity				
White	0.92	0.41–2.07	1.01	0.28–3.64
Other	1.00	–	1.00	–
Income				
<70 000	1.00	–	1.00	–
≥70 000	–	–	3.68[1]	1.29–10.54
Education				
<16	1.00	–	1.00	0.00
≥16	0.38	0.11–1.31	0.36	0.06–2.17
Residence				
Urban	1.00	–	1.00	–
Rural	1.08	0.55–2.14	0.71	0.25–2.06
Region				
Northeast	1.69	0.66–4.36[4]	1.99	0.59–6.76[5]
Midwest	1.39	0.55–3.57	0.54	0.09–2.92
West	1.30	0.49–3.41	0.52	0.97–2.78
South	1.00	–	1.00	–
Latitude				
North	1.00	–	1.00	–
Middle south	0.82	0.35–1.91[6]	0.92	0.26–3.28[7]
South	0.79	0.34–1.81	0.73	0.19–2.75

1. $P < 0.05$ chi-squared statistics used. Only the income stratification for major depression was significant at the $P < 0.05$ level.
2. $\chi^2_3 = 7.67$, $P = 0.05$.
3. $\chi^2_3 = 6.68$, $P = 0.08$.
4. $\chi^2_3 = 1.26$, $P = 0.74$.
5. $\chi^2_3 = 4.74$, $P = 0.19$.
6. $\chi^2_3 = 0.42$, $P = 0.81$.
7. $\chi^2_3 = 0.22$, $P = 0.90$.

with minor depression do so. The estimates of prevalence of major depression with a seasonal pattern is 0.4% for strict criteria (major depression only) and 1.0% if minor depression is included.

Bivariate relationships of persons experiencing major and minor depression by seasonal pattern are presented in Table 2 using the narrow definition of major and minor depression with a seasonal pattern. Females were found to have less risk of a seasonal pattern of major depression but more risk for minor depression. In addition, older persons were more likely to experience a seasonal pattern (the older persons with a lifetime history of major depression in this study were more likely to have had repeated episodes of depression and therefore, perhaps, more likely to meet criterion (d)). Females and persons with higher income were more likely to experience minor depression with a seasonal pattern. The second highest odds ratio in Table 2 is for those with minor depression with a seasonal pattern and a high income. This finding is unexpected and unexplained. Latitude of residence was not associated with a seasonal pattern.

DISCUSSION

Prevalence estimates

Prevalence estimates for major depressive episode with a seasonal pattern were much lower (0.4% for major depression and 1.0% for major and minor depression) than those reported in previous studies of SAD. This lower estimate of prevalence is likely to be due to two factors.

First, it is due to the algorithm applied by DSM–III–R and DSM–IV to diagnose major depression with a seasonal pattern in contrast to the algorithm used in previous community-based studies of SAD. Specifically, studies of SAD to date have used the SPAQ, which determines the seasonality of a series of symptoms and then determines the overall severity of the symptoms. The SPAQ does not assess the actual prevalence of a major affective episode but, rather, assesses the severity of the seasonal mood disturbance.

Second, the criteria for major depression with a seasonal pattern in DSM–III–R are more restrictive than those proposed by Rosenthal (1984). If the DSM–III–R criteria are applied, that is only persons who meet criteria for a lifetime history of a major depressive episode (recurrent) which follows a seasonal pattern, then the prevalence estimate is reduced substantially.

Comparison of SAD with DSM–III–R major depression with a seasonal pattern

These findings do not contradict the findings that seasonal patterns of mood disturbances are highly prevalent, as described by Kasper et al (1989) and others. When considering symptoms assessed retrospectively, such as social activity, mood, weight change, sleep, appetite and energy, it is apparent that seasonal changes in these moods and behaviours are frequent. For example, 203 of the 1382 subjects diagnosed with major depression stated that most of their depressive feelings began in the same month of every year. Seasonal pattern changes in mood and other behaviours which are problematic are less frequent but still considerably more frequent than the prevalence of major depressive episodes with a seasonal pattern. The data from the NCS are much more in accordance with the data from Sakamoto et al (1993) in that actual seasonal patterns among depressed subjects diagnosed with major depression were relatively infrequent.

The present study also demonstrates that when subjects are specifically probed regarding the more restrictive criteria in determining seasonal patterns, lower prevalence of seasonal patterns is reported. In other words, when subjects were 'pinned down' as to when the symptoms actually began and ended, the frequency decreased to 33 subjects who met criteria for a major depressive episode with a seasonal pattern according to DSM–IV. Therefore, the questions from the NCS did not 'underestimate' the perception among subjects that they experienced a seasonal pattern of their disorder (between 10 and 20% did so). Rather, the specificity of the seasonal pattern limited the frequency of a diagnosis. A similar pattern is observed in the diagnosis of late luteal phase dysphoria disorder (Kessler, 1998).

Risk factors associated with DSM–III–R major depression with a seasonal pattern

When the distribution of major depressive episode with a seasonal pattern was considered across a number of demographic factors, some findings were expected whereas others were not. In contrast to previous studies, the pattern was more frequent in males and also more frequent in older subjects. One would expect the pattern to be more frequent among older subjects, given that their likelihood of having repeated episodes has increased by living more years at risk for the development of a disorder. Minor depression with a seasonal pattern was found to be, perhaps, more frequent among women than among men. The finding of a greater likelihood of seasonal disorder among the more educated, especially high school graduates, is unexplained. In addition, the finding of a lower prevalence in urban and suburban areas compared with rural areas remains unexplained.

ACKNOWLEDGEMENTS

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DAN G. BLAZER, PhD, Department of Psychiatry, Duke University Medical Center, North Carolina; RONALD C. KESSLER, PhD, Institute for Social Research/Survey Research Center, Department of Sociology, The University of Michigan; MARVIN S. SWARTZ, MD, Department of Psychiatry, Duke University Medical Center, Durham, North Carolina

Correspondence: Dan G. Blazer, J.P. Gibbons Professor of Psychiatry, Dean of Medical Education, Duke University Medical Center, Box 3005, Durham, NC 27710

The British Journal of Psychiatry

Epidemiology of recurrent major and minor depression with a seasonal pattern. The National Comorbidity Survey.

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